



Progress Energy

DEC 06 2004

Serial: HNP-04-135
10 CFR 50.54(f)

U.S. Nuclear Regulatory Commission
ATTN: NRC Document Control Desk
Washington, DC 20555

SHEARON HARRIS NUCLEAR POWER PLANT, UNIT NO. 1
DOCKET NO. 50-400 / LICENSE NO. NPF-63

**RESPONSE TO REQUEST FOR ADDITIONAL INFORMATION REGARDING
NRC BULLETIN 2003-01 FOR POTENTIAL IMPACT OF DEBRIS BLOCKAGE ON
EMERGENCY SUMP RECIRCULATION AT PRESSURIZED-WATER REACTORS**

Ladies and Gentlemen:

On October 6, 2004, the Harris Nuclear Plant (HNP) received from the Nuclear Regulatory Commission (NRC) a request for additional information (RAI) regarding the HNP response (HNP-03-080 dated August 8, 2003) to NRC Bulletin 2003-01, "Potential Impact of Debris Blockage on Emergency Sump Recirculation at Pressurized-Water Reactors" (dated June 9, 2003). This additional information will facilitate the NRC's review of the HNP response to NRC Bulletin 2003-01.

Attachment 1 provides the requested information for the Harris Nuclear Plant. Please refer any questions regarding this submittal to Mr. David H. Corlett at (919) 362-3137.

I declare, under penalty of perjury, that the attached information is true and correct.
(Executed on December 6, 2004.)

Sincerely,

Terry C. Morton
Manager, Support Services

TCM/rg
Attachment

1. Response to Request for Additional Information Regarding NRC Bulletin 2003-01

c: Mr. R. A. Musser (NRC Senior Resident Inspector)
Ms. B. O. Hall (Section Chief, N.C. DENR)
Mr. C. P. Patel (NRR Project Manager, NRC)
Dr. W. D. Travers (NRC Regional Administrator, Region II)

Progress Energy Carolinas, Inc.
Harris Nuclear Plant
P.O. Box 165
New Hill, NC 27562

A103

SHEARON HARRIS NUCLEAR POWER PLANT UNIT 1

DOCKET NO. 50-400/LICENSE NO. NPF-63

ATTACHMENT 1

**Response to Request for Additional Information Regarding NRC Bulletin 2003-01,
“Potential Impact of Debris Blockage on Emergency Sump Recirculation at
Pressurized-Water Reactors”**

Attachment 1 to Letter HNP-04-135
Response to Request for Additional Information Regarding NRC Bulletin 2003-01

By letter dated August 8, 2003, the Carolina Power and Light Company (the licensee, CP&L) provided the 60-day response to NRC Bulletin 2003-01 for the Shearon Harris Nuclear Power Plant, Unit 1. The Bulletin requested CP&L to either (1) state that the emergency core cooling system (ECCS) and containment spray system (CSS) recirculation functions have been analyzed with respect to the potentially adverse post-accident debris blockage effects identified in the Bulletin and are in compliance with all existing applicable regulatory requirements, or (2) describe any interim compensatory measures that have been implemented or that will be implemented to reduce the interim risk associated with potentially degraded or nonconforming ECCS and CSS recirculation functions until an evaluation to determine compliance is complete. The NRC staff has completed its preliminary review of your response and has determined it needs the following additional information to complete our review:

- 1. On page A1-7 of Attachment 1 of your Bulletin 2003-01 response, you state that "any generic changes to the WOG ERG guidance will be evaluated as part of an Owners Group program and incorporated into HNP EOPs as appropriate ..." The Westinghouse Owners Group (WOG) has developed operational guidance in response to Bulletin 2003-01 for Westinghouse and CE-type pressurized-water reactors (PWRs). Please provide a discussion of your plans to consider implementing this new WOG guidance. Include a discussion of the WOG-recommended compensatory measures that have been or will be implemented at your plant, and the evaluations or analyses performed to determine which of the WOG-recommended changes are acceptable at your plant. Provide technical justification for those WOG-recommended compensatory measures not being implemented by your plant. Also include a detailed discussion of the procedures being modified, the operator training being implemented, and your schedule for implementing these compensatory measures.*

Response 1:

In March 2004, Westinghouse issued WCAP-16204, Revision 1, "Evaluation of Potential ERG and EPG Changes to Address NRC Bulletin 2003-01 Recommendations." HNP has reviewed the WCAP recommended Candidate Operator Actions (COAs). Based on the below discussion of each COA, the COAs have either been incorporated into plant procedures and training, are not applicable, or are not being implemented as an interim compensatory measure.

HNP is a Westinghouse PWR with a dry containment. A discussion of each COA applicable to HNP follows:

Candidate Operator Actions (COAs):

- **A1a-W – Operator Action to Secure One Spray Pump**

This COA is not being implemented at this time.

Attachment 1 to Letter HNP-04-135
Response to Request for Additional Information Regarding NRC Bulletin 2003-01

The Loss of Coolant Accident (LOCA) dose analysis assumes continuous containment spray. A reanalysis and potential licensing basis revision would be required to address spray flow interruption due to a single failure of the running Containment Spray (CS) pump.

An evaluation of containment pressure and temperature would be required to show that they remain below the peak LOCA values and Equipment Qualification (EQ) curves during the time delay to start the secured CS pump, if the active pump is lost. This would require reevaluation of the LOCA containment model for some limiting case to bound the heat-up and pressure change caused by the temporary loss of containment spray. Any increase in containment pressure would require revision to the licensing basis and the 10 CFR 50, Appendix J, testing program.

WCAP-16204 concludes that this COA is risk neutral. Implementing this COA would provide the potential for a modest increase in the time to initiate containment recirculation during a small break LOCA, but would have a negligible impact on the plant response to a large break LOCA. However, during a small break LOCA, less debris is generated, ECCS sump flow rates are reduced, and the required net positive suction head (NPSH) is lower. Therefore, the costs to perform the required analyses, along with the subsequent program and document changes, are not justified for a neutral benefit to risk.

- **A1b – Operator Action to Secure Both Spray Pumps**

This COA is not being implemented at this time.

The discussion for A1a-W also applies to this COA. Additionally, this COA is intended for plants that do not use containment spray for sump pH control. HNP uses containment spray, along with the associated spray additive (NaOH), for sump pH control.

- **A2 – Manually Establish One Train of Containment Sump Recirculation Prior to Automatic Actuation**

This COA is not being implemented at this time.

This COA is recommended for plants that can secure one train of ECCS or can secure at least one CS pump as suggested in COA A1a-W. Since A1a-W is not being implemented at this time, COA A2 is also not being implemented at this time.

Attachment 1 to Letter HNP-04-135
Response to Request for Additional Information Regarding NRC Bulletin 2003-01

- **A3-W – Terminate One Train of Safety Injection After Recirculation Alignment**

This COA is not being implemented at this time.

HNP has two independent recirculation sump structures (one per train); each sump structure has 398 square feet of screen area. Both recirculation sump structures are located outside the bioshield wall and are separated by ninety degrees of arc. Securing one Residual Heat Removal (RHR) pump after recirculation does not reduce flow to the sump supporting the running RHR pump. In addition, the current LOCA analyses assume limiting single failures. For a LBLOCA, the limiting single failure is loss of an RHR pump. For a SBLOCA, the limiting single failure is the loss of a diesel generator, which results in the loss of one Charging/Safety Injection Pump (CSIP). Securing one train of safety injection after the switchover to recirculation could place the plant in the configuration analyzed for the most limiting single failure without yet taking the single failure. If an RHR pump is secured, a single failure could result in a no-flow situation. Given the relative robustness of the HNP recirculation sump design, it is not recommended to pursue this COA which could result in a no-flow situation without an evaluation showing the acceptability of the no-flow situation.

- **A4 – Early Termination of One LPSI/RHR Pump Prior to Recirculation Alignment**

This COA is not being implemented at this time.

WCAP-16204 states that stopping one low-head pump before recirculation is not risk beneficial due to the risk of core damage upon single failure of the one operating low-head pump. The current LOCA analyses assume limiting single failures. For a LBLOCA, the limiting single failure is loss of an RHR pump. In addition, HNP has two independent recirculation sump structures (one per train); each sump structure has 398 square feet of screen area. Both recirculation sump structures are located outside the bioshield wall and are separated by ninety degrees of arc. Securing one RHR pump prior to recirculation does not reduce flow to the sump supporting the running RHR pump. Therefore, actions to secure one of these pumps during an event are not risk beneficial.

- **A5 – Refill of Refueling Water Storage Tank**

This COA has been implemented.

As indicated in WCAP 16204, Revision 1 this action provides a significant positive risk impact. In our 60-day response to Bulletin 2003-01, Compensatory Measure 3, HNP discussed implementation actions that address this COA. This COA has been implemented by incorporation into HNP Emergency Operating Procedures which provides instructions to refill the RWST after the transfer to cold leg recirculation has

Attachment 1 to Letter HNP-04-135
Response to Request for Additional Information Regarding NRC Bulletin 2003-01

been completed. The alternate sources identified to refill the RWST include the following:

- Reactor Water Makeup
 - Fuel Pool Transfer Canals
 - Demineralized Water
 - Fire Service Water
-
- **A6 – Inject More Than One RWST Volume From a Refilled RWST or by Bypassing the RWST**

This COA has been implemented.

As indicated in WCAP 16204, Revision 1 this action provides a significant positive risk impact. In our 60-day response to Bulletin 2003-01, Compensatory Measure 3, HNP discussed implementation actions that address this COA. This COA has been implemented by incorporation into HNP Emergency Operating Procedures which provides instructions to re-establish injection using a CSIP aligned to the re-filled RWST or if necessary to an alternate water source such as the Volume Control Tank and the Boric Acid Tank.

- **A7 – Provide More Aggressive Cooldown and Depressurization Following a Small Break LOCA**

This COA is applicable only to Combustion Engineering EPGs. The HNP Emergency Operating Procedures already address maximizing cooldown rate up to the Technical Specification limit.

- **A8-W – Provide Guidance on Symptoms and Identification of Containment Sump Blockage**

This COA has been implemented.

In our 60-day response to Bulletin 2003-01, Compensatory Measure 1, HNP discussed implementation actions that address this COA.

- **A9-W – Westinghouse Plants Develop Contingency Actions in Response to: Containment Sump Blockage, Loss of Suction, and Cavitation**

This COA has been implemented.

This COA includes a subset of eight potential actions, as follows:

Attachment 1 to Letter HNP-04-135
Response to Request for Additional Information Regarding NRC Bulletin 2003-01

1. Stop pumps experiencing loss of suction to prevent permanent pump damage. This action is already included within the emergency procedures.
 2. Reduce recirculation flow to the minimum required to support design basis or critical safety functions. This action is already included within the emergency procedures.
 3. Verify containment cooling unit operation to minimize cooling demand for containment spray flow. This action is implemented in the emergency procedures.
 4. Establish alternate water sources to inject into the reactor core and spray into the containment. This action has been added to the emergency procedures, but only as a last resort if recirculation from the sump is lost.
 5. Optimize use of available sources of flow for injection into the reactor core and spray into the containment. This action is implemented in the emergency procedures.
 6. Cooldown and depressurize the reactor coolant system (RCS) using the secondary system to reduce required injection flow to the RCS and allow placing the RHR system in service. This action is implemented in the emergency procedures.
 7. Backflush the recirculation flow path to remove blocking material from the sump screens. WCAP-16204 states that this action should not be included in the ERGs and recommends that it not be implemented.
 8. Vent pumps that have become air-bound. This action was not incorporated into the emergency procedures based on consideration of potentially high operator doses required to perform the activity. However, existing procedures include the necessary steps to vent the RHR system, and the Emergency Response Organization could recommend such a mitigating strategy if the conditions dictate and radiological conditions allow the task to be performed.
- **A10 – Early Termination of One Train of HPSI/High-Head Injection Prior to Recirculation Alignment (RAS)**

This COA is not being implemented at this time.

As indicated in WCAP 16204, Revision 1, this COA has unacceptable consequences demonstrated by single failure analysis. The current LOCA analyses assume limiting single failures. For a SBLOCA, the limiting single failure is the loss of a diesel generator, which results in the loss of one CSIP. Securing a CSIP may place the plant in its most limiting analyzed configuration for a SBLOCA. Therefore, actions to secure one of these pumps during an event are not being implemented at this time.

Attachment 1 to Letter HNP-04-135
Response to Request for Additional Information Regarding NRC Bulletin 2003-01

2. *NRC Bulletin 2003-01 provides possible interim compensatory measures licensees could consider to reduce risks associated with sump clogging. In addition to those compensatory measures listed in Bulletin 2003-01, licensees may also consider implementing unique or plant-specific compensatory measures, as applicable. Please discuss any possible unique or plant-specific compensatory measures you considered for implementation at your plant. Include a basis for rejecting any of these additional measures.*

Response 2:

HNP has not considered for implementation any possible unique or plant-specific interim compensatory measures beyond those listed in the response to NRC Bulletin 2003-01.